16550 Serial Ports & Bi-directional Parallel Port

HighSpeed I/O Controller IDE Professional

User's Manual

SIIG, Inc.

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About this Manual

The purpose of this manual is to introduce you to your IDE Professional High-Speed I/O Controller Board. It will guide you on how to configure and install the board for proper operation in your computer. Please save this manual for future reference in the event you wish to connect other devices to your system.

This manual is comprised of the following sections:

Chapter 1: Introduction
Introduces the IDE Professional and its features.

Chapter 2: Quick Installation
Provides a quick summary of jumper settings for configuring the IDE Professional for proper operation.

Chapter 3: Hardware Installation
Provides instructions on how to configure the IDE Professional for proper operation, plus installation in your computer. It also includes instructions for using the Microsoft Diagnostics MSD.EXE.

Chapter 4: Technical Reference
Provides the pin assignments for disk drive, serial, parallel and game port connectors.

Chapter 1 Introduction

1-1 Introducing the IDE Professional

Congratulation on your purchase of the IDE Professional High-Speed I/O Controller Board. Your IDE Professional is a high-performance 16-bit all-in-one I/O controller for use in AT-compatible personal computers. It supports up to two IDE hard disk drives and two floppy disk drives up to 2.88MB (5.25" 360KB/1.2MB and/or 3.5" 720KB/1.44MB/ 2.88MB). It also provides two high-speed RS-232C serial ports (one 9-pin and one 25-pin), one enhanced bi-directional parallel port, and one game port.

The IDE Professional provides the latest in interface technology for connecting today's high-performance peripheral devices to your computer. The on-board chipset controls the high-speed bi-directional parallel port and includes two high-speed 16C550 compatible UARTs for serial ports.

Key features include: support for high-speed serial devices with baud rates of up to 115.2K; COM1 through COM4 port configuration; interrupt request selection from IRQ3 to IRQ12, where the port(s) can be configured with a high IRQ (IRQ 10 and above) to free the regular IRQ lines (IRQ9 and below) for other interface cards; advanced ECP and EPP parallel port capabilities.

The on-board chipset controls the high-speed bi-directional parallel port and includes two high-speed 16C550 compatible UARTs for serial ports. It supports baud rates up to 115.2K bps which is ideal for use with external high-speed serial devices such as a 28.8K external MNP5 modem (with effective 115.2K throughput).

The parallel port supports the advanced capabilities of both Microsoft's Extended Capabilities Port (ECP) and Intel's Enhanced Parallel Port (EPP) specifications. The bi-directional parallel port can also be used as a standard printer port, or it can be used to communicate with other devices such as external drives and SCSI drives when a parallel-to-SCSI adapter interface is used.

1-1.1 Key Features and Benefits

- Compatible with AT-compatible computers
- Supports up to two IDE hard disk drives
- Supports up to two 5.25" 360KB/1.2MB and/or 3.5" 720KB/1.44MB/2.88MB floppy drives
- 16550 UART chip technology for high-speed serial communications with send/receive 16 byte FIFOs
- Two 16550 serial ports (one 9-pin and one 25-pin) to support mice, serial printers, external modems and other serial peripherals
- One game port for the support of a joystick
- One high-speed ECP/EPP bi-directional parallel port to use with printers and other devices that use the ECP/EPP standards
- Parallel port is ideal for use with external SCSI and tape drives, external LAN adapters, high-speed printers and conventional Centronics printers
- All ports can be individually configured and disabled
- The 16550 UARTs comply with National Semiconductor's 16550 AFN Standard

1-1.2 IDE Interface Features

- Fully ANSI ATA Ver. 3.1 compatible
- Supports pipelined read-ahead and posted write for concurrent operation
- Supports zero wait state 50MHz operation
- Enable/disable jumpers

1-1.3 Floppy Drive Interface Features

- Supports 3 1/2" (720KB/1.44MB/2.88MB) and 5 1/4" (360KB/1.2MB) floppy disk drives and Tape Drive
- Supports vertical recording core
- Detects all overrun and underrun conditions
- Non-Burst Mode DMA option with 16 byte data FIFO
- Enable/disable jumpers

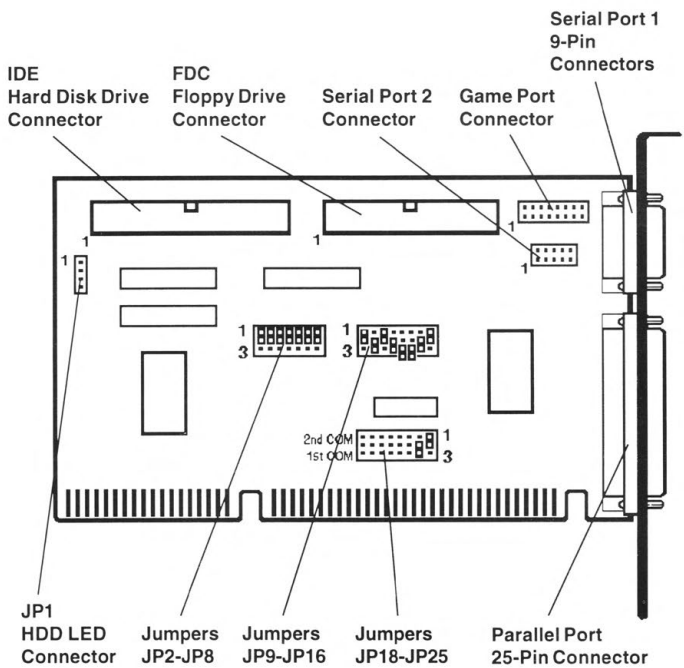
1-1.4 16550 Serial Port Features

- Two 16550 serial port with two 16-byte data buffers
- Supports COM1 - COM4 and interrupts IRQ 3, 4, 5, 7, 9, 10, 11 & 12 for maximum flexibility
- Programmable baud rate generator
- Especially designed to keep high-speed, external modems running at the fastest speed possible without any errors
- Enable/disable jumpers

1-1.5 Advanced Parallel Port Features

- Multi-mode parallel port with ChiProtect
- Supports LPT1 - 3 (3BC, 378, 278h) and interrupts 7 & 5
- Standard mode/high-speed bi-directional parallel port
- ECP (Microsoft & HP's Extended Capabilities Port) specifications compatibility
  - Enhances printing capabilities
  - Supports new cost-effective method of CD-ROM and scanner implementation
  - Data transfer rate over 2MB/sec
  - Auto strobe generation
  - 16-byte FIFO buffer ensures reliable data transfers
  - DMA support improves system performance
  - Incorporates ChiProtect Circuit for protection against damage due to printer power-on

- EPP (Intel's Enhanced Parallel Port) specifications compatibility
  - Bi-directional operation
  - Data transfer rate up to 2MB/sec
  - Auto strobe generation
  - Uses programmed I/O
  - Supports string I/O transfers
- Enable/disable jumpers



IDE Professional I/O Controller Board Layout

1-2 Carton Contents

Before installing your IDE Professional, verify that the following items are included in the packaging carton:

- One IDE Professional Controller Board
- One I/O expansion slot bracket with one game port and one 25-pin RS-232C serial port
- One ribbon cable with two 34-pin connectors
- One ribbon cable with two 40-pin connectors
- This User's Manual

Please consult your dealer if any item is damaged or missing.

Chapter 2
Quick Installation

This chapter provides a quick summary of jumper settings for configuring the IDE Professional Controller for proper operation in your system. Also refer to *Chapter 3* if you need further information on how to configure and install the board in your system.

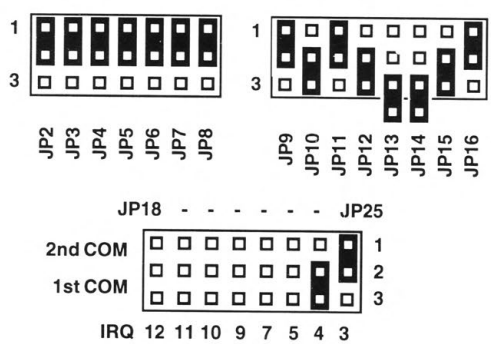
2-1 Connectors

J1 IDE:	IDE hard disk 40-pin connector
J2 FDC:	Floppy disk 34-pin connector
J3 GAME:	Connector for game port
J4 SERIAL 1:	Connector for 9-pin serial port 1
J5 SERIAL 2:	Connector for 25-pin serial port 2
J6 PRINTER:	25-pin parallel port
JP1:	HDD LED activity indicator connector

2-2 Jumpers

2-2.1 Factory Configured Settings

The following table and figure identify the default factory configured jumper settings.

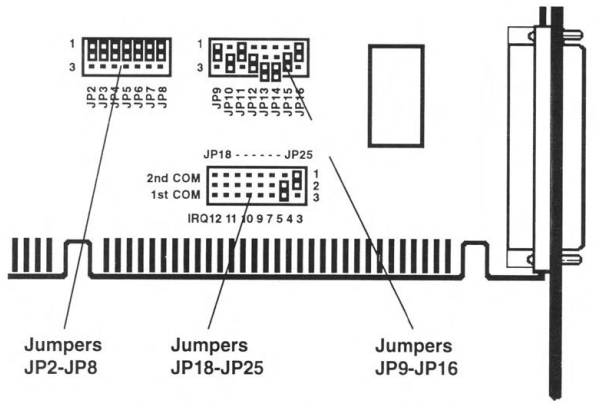


Factory Configured Settings (continued)

Description	Jumper		Default Setting
HDD Controller:	JP2	Pins 1-2	Enable
Floppy Controller:	JP3	Pins 1-2	Enabled
Serial Port 1 (9-pin):	JP4	Pins 1-2	COM1 3F8h
	JP5	Pins 1-2	
	JP24	Pins 2-3	IRQ4
Serial Port 2 (25-pin):	JP6	Pins 1-2	COM2 2F8h
	JP7	Pins 1-2	
	JP25	Pins 1-2	IRQ3
Game Port:	JP8	Pins 1-2	Enabled
Parallel Port:	JP9	Pins 1-2	378h
	JP10	Pins 2-3	
Parallel Port Mode:	JP11	Pins 1-2	
	JP12	Pins 2-3	EPP/bi-directional
ECP Parallel Port DMA Channel Select:			
	JP13	OFF	Disable
	JP14	OFF	
	JP15	Pins 2-3	
Parallel Port IRQ Channel Select:			
	JP16	Pins 1-2	IRQ7

Factory Configured Settings (continued)

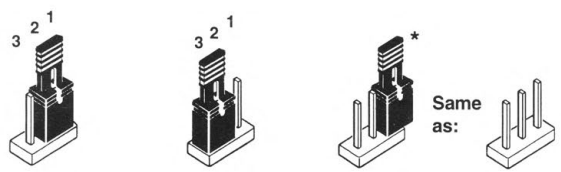
Description	Jumper		Default Setting
HDD Controller:	JP2	Pins 1-2	Enable
Floppy Controller:	JP3	Pins 1-2	Enabled
Serial Port 1 (9-pin):	JP4	Pins 1-2	COM1 3F8h
	JP5	Pins 1-2	
	JP24	Pins 2-3	IRQ4
Serial Port 2 (25-pin):	JP6	Pins 1-2	COM2 2F8h
	JP7	Pins 1-2	
	JP25	Pins 1-2	IRQ3
Game Port:	JP8	Pins 1-2	Enabled
Parallel Port:	JP9	Pins 1-2	378h
	JP10	Pins 2-3	
Parallel Port Mode:	JP11	Pins 1-2	
	JP12	Pins 2-3	EPP/bi-directional
ECP Parallel Port DMA Channel Select:			
	JP13	OFF	Disable
	JP14	OFF	
	JP15	Pins 2-3	
Parallel Port IRQ Channel Select:			
	JP16	Pins 1-2	IRQ7



IDE Professional Jumper Locations

2-2.2 Jumper Settings

The IDE Professional options are set via 3-pin jumper blocks JP2 through JP25. The following tables define the available jumper options which are set by installing a jumper on two of the three pins. The following illustrates the possible jumper positions on a 3-pin jumper:



Jumper Installed
Pins 1-2

Jumper Installed
Pins 2-3

No Jumper
Installed

** (Use this method to store jumper)*

IDE Hard Disk Drive Control

JP2	IDE Port
1–2	Enable* *(default)*
2–3	Disable

Floppy Disk Drive Control

JP3	Floppy Port
1–2	Enable* *(default)*
2–3	Disable

Serial Port 1

JP4	JP5	Addr.	COM
1–2	1–2	3F8h	COM1* *(default)*
1–2	2–3	2F8h	COM2
2–3	1–2	3E8h	COM3
2–3	2–3	Disable	

Jumper	Pins	IRQ
JP25	2-3	IRQ3
JP24	2-3	IRQ4* *(default)*
JP23	2-3	IRQ5
JP22	2-3	IRQ7
JP21	2-3	IRQ9
JP20	2-3	IRQ10
JP19	2-3	IRQ11
JP18	2-3	IRQ12

*= *Factory Default*

Serial Port 2

JP6	JP7	Address	COM	IRQ
1–2	1–2	2F8h	COM2* *(default)*	
1–2	2–3	3F8h	COM1	
2–3	1–2	2E8h	COM4	
2–3	2–3	Disable		

Jumper	Pins	IRQ
JP25	1-2	IRQ3* *(default)*
JP24	1-2	IRQ4
JP23	1-2	IRQ5
JP22	1-2	IRQ7
JP21	1-2	IRQ9
JP20	1-2	IRQ10
JP19	1-2	IRQ11
JP18	1-2	IRQ12

Game Port

JP8	Game Port
1–2	Enable* *(default)*
2–3	Disable

Parallel Port Control

JP9	JP10	Address
1–2	1–2	278h
1–2	2–3	378h* *(Default)*
2–3	1–2	3BCh
2–3	2–3	Disable

Parallel Port Mode Control

JP11	JP12	Parallel Port Mode
1–2	1–2	ECP & EPP
1–2	2–3	EPP/bi-directional* *(default)*
2–3	1–2	ECP
2–3	2–3	SPP

*= *Factory Default*

ECP Parallel Port DMA Channel Select

JP13	JP14	JP15	DMA Channel
1–2	1–2	1–2	DRQ1, DACK1
2–3	2–3	1–2	DRQ3, DACK3
OFF	OFF	2–3	Disable* *(default)*

Port IRQ Channel Select

JP16	IRQ Channel
1–2	IRQ7* *(default)*
2–3	IRQ5

*= *Factory Default*

Chapter 3 Installation

This chapter will guide you through the installation of your IDE Professional board. It includes instructions on:

- how to use MSD.EXE to verify the status of ports and interrupts used in your system
- how to properly configure the jumpers on your IDE Professional board
- how to install your IDE Professional board in your computer

3-1 Running MSD.EXE

Before installing the IDE Professional board in your computer, you must know the addresses and interrupts used by the COM ports in your system. This can be easily determined by running the Microsoft Diagnostics MSD.EXE.

At the C:\DOS> or C:\WINDOWS> prompt (or subdirectory where MSD.EXE is stored), type:

MSD and press **<Enter>**.

MSD will examine your system and display a configuration screen similar to the following example:

File Utilities Help			
Computer...	American Megatrend 80386	Disk Drive...	A: B: C: D: E: F:
Memory...	640K, 3072K Ext	LPT Ports...	3
Video...	VGA, TSENG	COM Ports...	2
Network...	Novell Shell 3.26.00	IRQ Status...	
OS Version...	MS-DOS Version 6.2 Windows 3.10	TSR Programs...	
Mouse...	Serial Mouse	Device Drivers...	
Other Adapters...	Game Adapter		
Press ALT for menu, or press highlighted letter, or F3 to quit MSD.			

To check the addresses and status of the COM ports in your system, press the underlined letter **C.** MSD will display a screen similar to the one shown below.

COM Ports

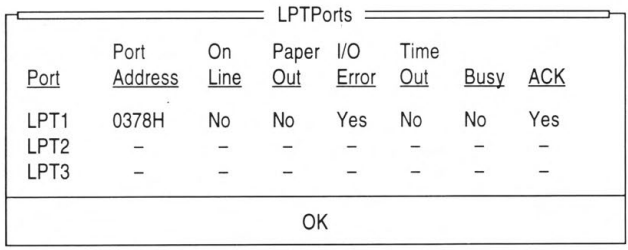
	COM1	COM2	COM3	COM4
Port Address	0378H	02F8H	N/A	N/A
Baud Rate	2400	2400		
Data Bits	7	7		
Stop Bits	1	1		
Carrier Detect (CD)	No	No		
Ring Indicator (RI)	No	No		
Data Set Ready (DSR)	No	No		
Clear To Send (CTS)	No	No		
UART Chip Used	8250	8250		

COM Ports: Displays status of serial ports.

The following table shows the standard order of address assignments for each COM port. However, if MSD detects that you have a port address at 02E8H and does not detect a port address at 03E8H (COM3), MSD will list 02E8H as COM3 by putting the address in the next available COM port. In reality, 02E8H is still COM4 and not COM3. Therefore, it is important that you pay attention to the address of the port to find out what COM ports are used and what COM ports are available.

COM Port	Port Address
COM1	03F8H
COM2	02F8H
COM3	03E8H
COM4	02E8H

To check the addresses and status of the LPT ports in your system, press the underlined letter **L.** MSD will display a screen similar to the one shown below.



LPT Ports: Displays status of parallel ports.

The following table shows the standard order of address assignments for each LPT port. Unlike serial ports, which can be specifically set as COM1, COM2, COM3 or COM4, LPT parallel ports are determined by the highest I/O port address. The highest address in the system is always LPT1; the second highest, LPT2; the third, LPT3. The prioritized order for I/O port addresses is: 3BC, 378 and 278. However, if MSD detects that you have a port address at 0378H and does not detect a port address at 03BCH, MSD will list 0378H as LPT1.

LPT Port	Port Address
LPT1	03BCH
LPT2	0378H
LPT3	0278H

Next, you need to check the IRQ Status and find if IRQ's 3 and 4 are available or are being used. When in the main menu screen, press the letter **Q**. MSD will display a screen similar to the following example.

File Utilities Help

IRQ Status

IRQ	Address	Description	Detected	Handled By
0	1C4F:0000	Timer Click	Yes	win386.exe
1	0525:16E8	Keyboard	Yes	Block Device
2	038E:0057	Second 8259A	Yes	Default Handlers
3	0BA3:316F	COM2: COM4:	COM2:	
4	038E:0087	COM1: COM3:	COM1:	Default Handlers
5	038E:009F	LPT2:	Yes	Default Handlers
6	038E:00B7	Floppy Disk	Yes	Default Handlers
7	0070:06F4	LPT1:	Yes	System Area
8	038E:0052	Real-Time Clock	Yes	Default Handlers
9	F000:EEC7	Redirected IRQ2	Yes	BIOS
10	0038E:00CF	(Reserved)		Default Handlers
11	038E:00E7	(Reserved)		Default Handlers
12	038E:00FF	(Reserved)		Default Handlers
13	F000:EED0	Math Coprocessor	No	BIOS
14	038E:0117	Fixed Disk	Yes	Default Handlers
15	F000:FF53	(Reserved)		BIOS

IRQ Status: Displays current usage of hardware interrupts.

NOTE: MSD will only recognize IRQ 7 and 5 for LPT ports. Therefore, if you have your LPT ports set for any IRQ other that 7 or 5, MSD will not display it.

3-2 Configuring the IDE Professional

Prior to installing the IDE Professional board in your computer, verify the jumper switches on the board for proper operation. To do this, you must know the following about your computer:

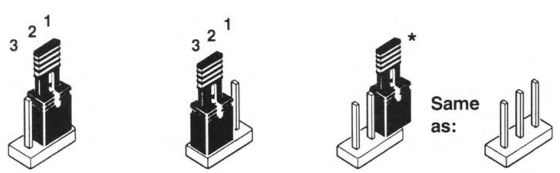
Are there any other hard and/or floppy disk drive controllers installed in your computer?

Are there any serial or parallel ports currently installed in your computer? If so, what I/O port addresses and Interrupts (IRQ) do they use?

After determining your computer's configuration, make sure the port addresses and IRQs set on the IDE Professional board are different from any existing ports in your system. A conflict results when two addresses are the same. Refer to the next sections for determining the correct jumper settings for configuring ports on the board.

3-2.1 Setting Jumpers

The IDE Professional options are set via 3-pin jumper blocks JP2 through JP25. The following tables define the available jumper options which are set by installing a jumper on two of the three pins. The following illustrates the possible jumper position when pins 1-2 and pins 2-3 are jumpered on a 3-pin jumper block. It also shows the non-jumpered position.

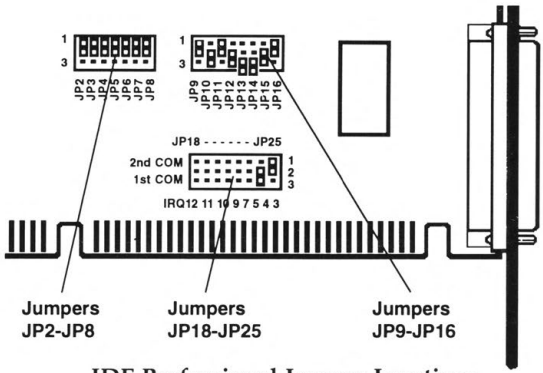


Jumper Installed Pins 1-2

Jumper Installed Pins 2-3

No Jumper Installed

***(Use this method to store jumper)**

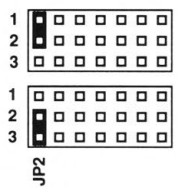


IDE Professional Jumper Locations

3-2.2 IDE Hard Disk Drive Control

The IDE hard disk drive controller interface is factory set for normal operation (*enabled*). If you have another IDE hard disk controller in your system, the IDE controller on the IDE Professional can be *disabled* by changing the **JP2** jumper.

JP2	IDE Port
1–2	Enable*
2–3	Disable

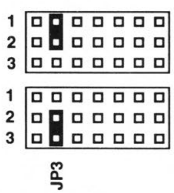


3-2.3 Floppy Disk Drive Control

The floppy disk drive controller interface is factory set for normal operation (*enabled*). If you have another floppy disk controller in your system, the floppy controller on the IDE Professional can be *disabled* by changing the **JP3** jumper.

JP3	FDC Port
1–2	Enable*
2–3	Disable

*= *Factory Default*

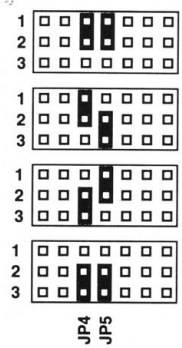


3-2.4 Serial Port 1

The primary Serial Port 1 connector (J4) connects to the standard DB-9 9-pin connector mounted on the board. It is factory set as **COM1** with I/O port address **3F8h** and **IRQ4**. If this conflicts with your current configuration, the address assignments can be changed by resetting the following jumpers on **JP4**, **JP5** and **JP24**.

Serial Port 1 - COM Address

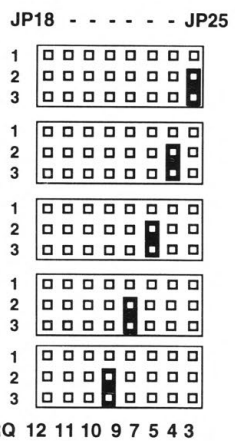
JP4	JP5	Addr.	COM
1–2	1–2	3F8h	COM1*
1–2	2–3	2F8h	COM2
2–3	1–2	3E8h	COM3
2–3	2–3	Disable	



Serial Port 1 - IRQ Channel Select

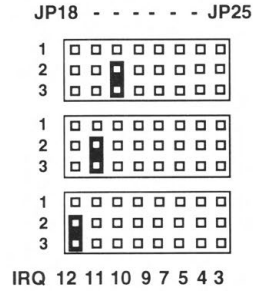
Jumper	Pins	IRQ
JP25	2-3	IRQ3
JP24	2-3	IRQ4*
JP23	2-3	IRQ5
JP22	2-3	IRQ7
JP21	2-3	IRQ9

*= *Factory Default*



Serial Port 1 - IRQ Channel Select *(continued)*

Jumper	Pins	IRQ
JP20	2-3	IRQ10
JP19	2-3	IRQ11
JP18	2-3	IRQ12

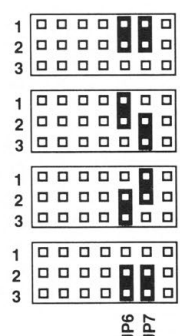


3-2.5 Serial Port 2

If you intend to use the secondary Serial Port 2 on the IDE Professional, you must install the second serial port connector included with the board. This port is factory set as **COM2** with I/O port address **2F8h** and **IRQ3**. If this conflicts with your current configuration, the address assignments can be changed by resetting the following jumpers on **JP6**, **JP7** and **JP25**.

Serial Port 2 - COM Address

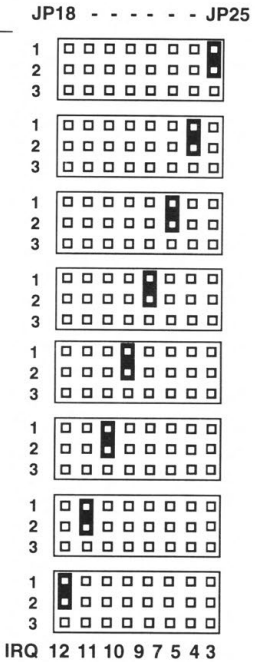
JP6	JP7	Addr.	COM
1–2	1–2	2F8h	COM2*
1–2	2–3	3F8h	COM1
2–3	1–2	2E8h	COM4
2–3	2–3	Disable	



*= *Factory Default*

Serial Port 2 - IRQ Channel Select

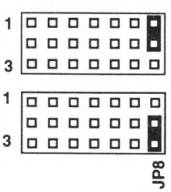
Jumper	Pins	IRQ
JP25	1-2	IRQ3*
JP24	1-2	IRQ4
JP23	1-2	IRQ5
JP22	1-2	IRQ7
JP21	1-2	IRQ9
JP20	1-2	IRQ10
JP19	1-2	IRQ11
JP18	1-2	IRQ12



3-2.6 Game Port Interface

The game port interface is factory set for normal operation (*enabled*). If you have another game port already installed in your system, the game port on the IDE Professional can be disabled by changing the **JP8** jumper.

JP8	Game Port
1–2	Enable*
2–3	Disable



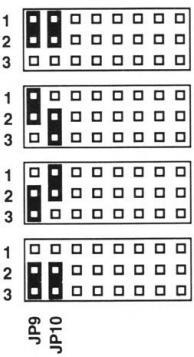
*= *Factory Default*

3-2.7 Parallel Printer Port

The parallel printer port provides a standard DB25 25-pin connector mounted on the board. It is factory set for I/O port address **378** and **IRQ7**. If this conflicts with your current configuration, the address assignments can be changed by resetting the following jumpers on **JP9, JP10, JP16**.

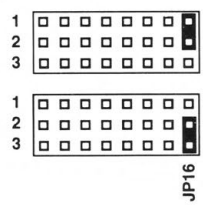
Parallel Port Control

JP9	JP10	Address
1–2	1–2	278h
1–2	2–3	378h*
2–3	1–2	3BCh
2–3	2–3	Disable



Parallel Port IRQ Channel Select

JP16	IRQ Channel
1–2	IRQ7*
2–3	IRQ5



*= *Factory Default*

Unlike serial ports, which can be specifically set as COM1, COM2, COM3 or COM4, LPT parallel printer ports are determined by the highest I/O port address. The highest address present in the system is always LPT1; the second highest, LPT2; the third, LPT3. The prioritized order for I/O port addresses is: 3BC, 378 and 278.

The following examples will help you determine how to configure the IDE Professional's parallel printer port.

Example 1:

When 0 parallel ports are already installed in your computer... the parallel port on the IDE Professional will be addressed as **LPT1** when its I/O port address is set to **3BC**, **378** or **278**.

Example 2:

When 1 parallel port with address 3BC is already installed... the parallel port on the IDE Professional will be addressed as **LPT2** when its I/O port address is set to **378** or **278**. (The original parallel port will be addressed as LPT1.)

Example 3:

When 1 parallel port with address 378 is already installed... the parallel port on the IDE Professional will be addressed as **LPT2** when its I/O port address is set to **278**.
(The original parallel port will be address as LPT1.)

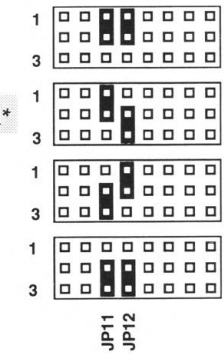
Example 4:

When 1 parallel port with address 278 is already installed... the parallel port on the IDE Professional will be addressed as **LPT1** when its I/O port address is set to **378**.
(The original parallel port will be address as LPT2.)

3-2.8 Parallel Port Mode

The parallel port is factory set as a bi-directional EPP (Enhanced Parallel Port). To change to ECP (Extended Capabilities Port), EPP and ECP, or SPP (Standard Parallel Printer) modes, reset the **JP11** and **JP12** jumpers.

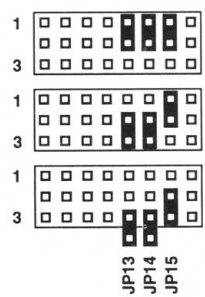
JP11	JP12	Parallel Port Mode
1–2	1–2	ECP & EPP
1–2	2–3	EPP/Bi-directional*
2–3	1–2	ECP
2–3	2–3	SPP



3-2.9 ECP Parallel Port DMA Channel Select

In **ECP** mode, the DMA method is used for fast data transfer. The IDE Professional is factory set as "Disabled".

JP13	JP14	JP15	DMA Channel
1–2	1–2	1–2	DRQ1, DACK1
2–3	2–3	1–2	DRQ3, DACK3
OFF	OFF	2–3	Disable*



*= *Factory Default*

3-3 Installing the IDE Professional

After you have verified the jumper settings of your IDE Professional, proceed with the following instructions to install it in your computer. General instructions for installing the board are given since the design of computer cases varies. Refer to your computer's reference manual whenever in doubt.

1. Turn OFF the power to your computer and any other connected peripheral devices. Follow the precautions for static electricity discharge.

   WARNING: STATIC ELECTRICITY DISCHARGE may permanently damage your system. In order to avoid possible static electricity discharge during installation procedures, please follow the guidelines below:

   - *Discharge any static electricity build up in your body by touching a large grounded metal surface such as the computer case if plugged in, a metal window frame, refrigerator, or water tap for a few seconds.*
   - *During installation procedures, avoid any contact with internal parts. Handle cards only by their edges.*

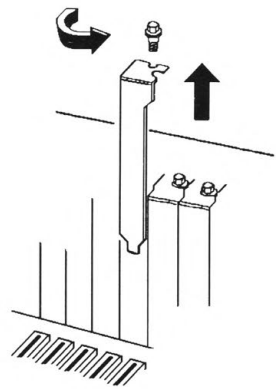
   WARNING: Disconnect the AC power source before removing the cover.

2. Unplug all power cords and cables from the back of the computer. (Be sure to note the cable connections for reconnection when the installation is complete.)

3. Remove your computer's cover by removing its mounting screws with a screwdriver. Slide the cover OFF.

4. Your IDE Professional board must be installed in an available 16-bit expansion slot. Also, if you intend to use the 25-pin serial port and/or game port, select an I/O expansion slot with an adjacent slot available for installing the additional connector bracket.

5. Remove the board's selected slot cover by unscrewing the holding screw and sliding it out. Save this screw for securing the IDE Professional board after it's installed. Follow the same procedure for the second connector bracket.



Remove the Slot Cover

6. To install the IDE Professional, carefully align the board's bus connector with the selected VL-bus connector slot on the motherboard. Push the board down firmly, but gently, until it is well seated.

   NOTE: Hold the board by its external edges only. Try to avoid touching the components, connectors or pins.

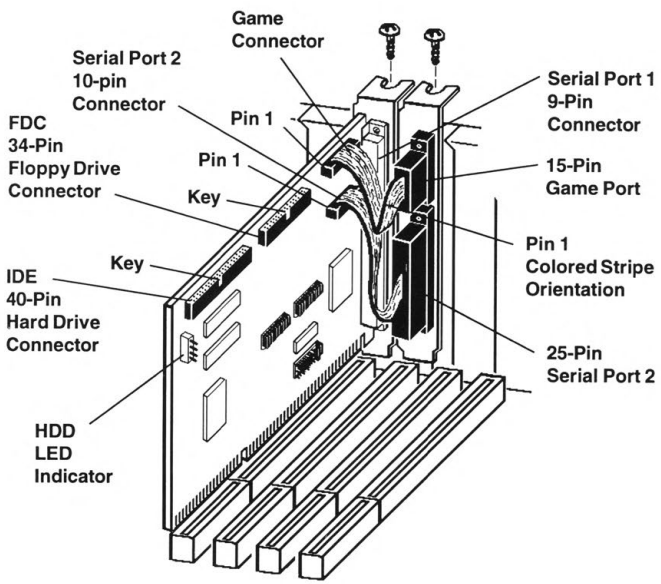
7. Replace the cover slot holding screw to secure the board to the rear slot panel.

8. To install the second connector bracket, carefully slide it into the selected rear panel slot where the slot cover had been removed. Replace the cover slot holding screw to secure the connector bracket in place.

9. If you installed the secondary connector bracket with the game and 25-pin serial port connectors, note that a ribbon cable is already attached to each port connector. Connect the loose end of each cable to the appropriate pin connector on the I/O Professional board.

   a. Connect the 10-pin connector end of the 25-pin serial port cable to the **J4** Serial Port 2 pin-connector block on the IDE Professional board. The colored stripe imprinted on the ribbon cable indicates the pin 1 side of the cable's connector. Make sure this is matched with pin 1 on the board's connector.

   b. Connect the 15-pin connector end of the game port cable to the **J3** GAME pin-connector block on the IDE Professional board. Again make sure the colored stripe side of the cable is matched with pin 1 on the board's connector.



Installing the IDE Professional and Connector Bracket

3-4 Connecting the Disk Drives

3-4.1 IDE Hard Disk Drive

1. If you have another hard disk controller in your computer, you should remove it. There is no guarantee that the IDE Professional will operate properly if both controllers are enabled in the system.

2. Attach the 40-pin ribbon cable that was included with the IDE Professional to the **IDE** J2 connector on the IDE Professional board. Note that the connector is keyed to insure that both pin 1s are matched. Make sure the connector is well seated when making the connection.

3. After installing the hard drive(s) in the computer, attach the other end of the 40-pin cable to the connector edge of the hard disk drive. Note that the ribbon cable has two connectors. If you have one drive, connect the last, end connector to the drive (drive C). If you have two drives, the middle connector attaches to drive D. Make certain that pin 1 on the cable matches pin 1 on the hard disk drive when making the connections.

4. If your computer has a hard disk activity LED, attach the connecting LED wire to the JP1 4-pin connector on the IDE Professional.

3-4.2 Floppy Disk Drive

1. If you have another floppy disk controller in your computer, you may experience address conflicts between the controllers. Either remove the existing floppy controller or disable either controller.

2. Attach the 34-pin ribbon cable that was included with the IDE Professional to connector **FDC** J2 on the board. Note that the connector is keyed to insure that both pin 1s are matched. Make sure the connector is well seated when making the connection.

3. After installing the floppy drive(s) in the computer, attach the other end of the 34-pin cable to the connector edge of the floppy disk drive. Note that the ribbon cable has two connectors. If you have one drive, connect the last, end connector to the drive (drive A). If you have two floppy drives, the middle connector attaches to drive B. Make certain that pin 1 on the cable matches pin 1 on the drive when making the connections.

After making all your internal connections, replace the computer's cover and screws. Then reconnect all power cords and cables to the back of the computer and make any new connections to the IDE Professional's ports.

Your IDE Professional board is now installed. However, if you have installed disk drives, you must now run your computer's CMOS SETUP program to identify the types of drives connected. Also, most computers will display a system configuration table, including port addresses when powered ON or rebooted. Reboot your system after running SETUP and verify that the I/O port addresses are set properly.

Chapter 4
Technical Reference

This chapter provides the pin assignments for the disk drives, serial, parallel and game port connectors on the IDE Professional High-Speed I/O Controller Board.

4-1 Connector Pin Assignments

4-1.1 IDE Interface

Pin assignments for the IDE 40-pin hard disk interface connector.

Pin	Function	Pin	Function
1	–Host Reset	21	Reserved
2	Ground	22	Ground
3	Host Data 7	23	–HIOW
4	Host Data 8	24	Ground
5	Host Data 6	25	–HIOR
6	Host Data 9	26	Ground
7	Host Data 5	27	Reserved
8	Host Data 10	28	Host ALE
9	Host Data 4	29	Reserved
10	Host Data 11	30	Ground
11	Host Data 3	31	IRQ14
12	Host Data 12	32	–Host ADD1
13	Host Data 2	33	Host ADD1
14	Host Data 13	34	–PDIAG
15	Host Data 1	35	–Host ADD0
16	Host Data 14	36	–Host ADD2
17	Host Data 0	37	Host CSO\0
18	Host Data 15	38	–Host CS1
19	Ground	39	–Host SLV/ACT
20	Key	40	Ground

4-1.2 Floppy Disk Interface

Pin assignments for the FDC 34-pin floppy disk interface connector.

Pin	Function	Pin	Function
1	Ground	18	–Direction
2	Reduced Write	19	Ground
3	Ground	20	–Step
4	Reserved	21	Ground
5	Ground	22	–Write Data
6	Reserved	23	Ground
7	Ground	24	–Write Gate
8	–Index	25	Ground
9	Ground	26	–Track 0
10	–Motor0	27	Ground
11	Ground	28	–Write Pro
12	–Drive Sel 1	29	Ground
13	Ground	30	–Read Data
14	–Drive Sel 0	31	Ground
15	Ground	32	–Side
16	–Motor 1	33	Ground
17	Ground	34	–Disk Change

4-1.3 Serial Port 1

Pin assignments for the primary Serial Port 1 9-pin connector.

Pin	Function
1	Data Carrier Detect
2	Receive Data
3	Transmit Data
4	Data Transmit Ready
5	Ground
6	Data Set Ready
7	Request to Send
8	Clear to Send
9	Ring Indicator

4-1.4 Serial Port 2

Pin assignments for the secondary Serial Port 2 25-pin connector.

Pin	Function
1	NC
2	Transmit Data
3	Receive Data
4	Request to Send
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Data Carrier Detect
9	NC
10	NC
11	NC
12	NC
13	NC
14	NC
15	NC
16	NC
17	NC
18	NC
19	NC
20	Data Terminal Ready
21	NC
22	Ring Indicator
23	NC
24	NC
25	NC

NC = No Connect

4-1.5 Parallel Printer Port

Pin assignments for the LPT 25-pin parallel port connector.

Pin No. (Computer)	Standard	Pin No. EPP	ECP	(Printer)
1	–Strobe	–Write	–Strobe	1
2	D0	D0	D0	2
3	D1	D1	D1	3
4	D2	D2	D2	4
5	D3	D3	D3	5
6	D4	D4	D4	6
7	D5	D5	D5	7
8	D6	D6	D6	8
9	D7	D7	D7	9
10	–Ack 1	Intr	–Ack	10
11	Busy	–Wait	Busy, PeriphAck(2)	11
12	PE	(NU)	Error, –AckReverse(2)	12
13	Select	(NU)	Select	13
14	–AutoFd	–Datastrb	–AutoFd HostAck(2)	14
15	–Error	(NU)	–Fault(1) –PeriphRequest(2)	32
16	–Init	(NU)	–Init(1) –ReverseRqst(2)	31
17	Select In	–AddrStrb	–Select In(1,2)	36
18-25	Gnd	Gnd	Gnd	16, 19-30, 33

– <*name*> = Active Low
(1) = Compatible Mode
(2) = High Speed Mode

NOTE: For the cable interconnection required for ECP support and the Slave Connector pin numbers, refer to the *Extended Capabilities Port Protocol and ISA Standard, Rev. 1.09, Jan. 7, 1993*. This document is available from Microsoft.

4-1.6 Game Port

Pin assignments for the 15-pin game connector.

Pin No. (8-Pin On-Board Connector)	Function	Pin No. (Cable with D-Type) 15-Pin Female Connector)
1	+5VDC	1
2	Button A	2
3	Position 0	3
4	Ground	4
5	Ground	5
6	Position 2	6
7	Button B	7
8	+5VDC	8
	Not Used	9–15

4-1.7 HDD Activity Indicator LED

Pin assignments for the 4-pin HDD LED connector.

Pin No.	Function
1	LED Anode (+)
2	LED Cathode (–)
3	LED Cathode (–)
4	LED Anode (+)